UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
AIR AND RADIATION DIVISION
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

DATE: October 17, 2007

SUBJECT: Inspection of Citgo Petroleum Corporation

FROM: Brian Dickens, Environmental Engineer BD
Enforcement and Compliance Assurance Section (MN/OH)
Enforcement and Compliance Assurance Branch

THRU: William L. MacDowell, Chief WLM
Enforcement and Compliance Assurance Section (MN/OH)
Enforcement and Compliance Assurance Branch

TO: File, Citgo - Lemont, IL

SOURCE NAME AND LOCATION:

Citgo Petroleum Corporation (Citgo)
135th Street and New Avenue
Lemont, IL 60439

DATE(S) OF INSPECTION: October 10, 2007

PARTICIPANTS:

Matt Klickman, Air Quality Coordinator, Citgo
John Martens, Process Technologist, Citgo (Part-time)
Dave Kielma, Process Supervisor, Citgo (Part-time)
Brian Dickens, Environmental Engineer, U.S. EPA
Erik Hardin, Environmental Scientist, U.S. EPA
Katie Siegel, Environmental Engineer, U.S. EPA

NEIGHBORHOOD DESCRIPTION:

The Citgo refinery is located on the west side of Lemont, Illinois, in an industrial and commercial corridor.

OFF-SITE OBSERVATIONS OF PLANT:

I detected no odor as I approached the plant from the east by car.

GENERAL PROCESS DESCRIPTION:

Citgo refines crude oil into combustion fuels, oils, asphalt, and other petroleum products.

PURPOSE AND SCOPE OF INSPECTION:

The purpose of the inspection was to assist in determining compliance with the Clean Air Act (CAA). Specifically, the inspection was limited to the investigation of Citgo's flare system.

APPLICABLE RULES:

Citgo was issued a Title V permit with ID 197090AAI on January 9, 2006. This permit and its subsequent amendments contain a full list of regulatory requirements. Section 7.7 of the permit pertains to the Gas Recovery System and Flares. The requirements include:

-Flare shall not produce opacity greater than 20%;
-Flares shall comply with 40 CFR 60 Subpart A and J.

PRE-INSPECTION CONFERENCE:

I and the other U.S. EPA personnel arrived at the plant's administration building at 08:30. The security officer signed us in and called Mr. Klickman. Mr. Klickman led us to a conference room. I presented my credentials to Mr. Klickman, explained the purpose of my visit, and asked that during our discussion they note confidential business information so that I could mark it as such in my inspection report.

Citgo has five flares. Each flare, and the operations that the flare controls, are stated below:

i. C1, or North Plant, receives vent streams from the aliphatic solvent units, catalytic reformer, and aromatics units;
ii. C2, or Block 2, receives vent streams from the fluidized catalytic cracking unit, sulfur plant, and conservation units;
iii. C3, or Block 3, receives vent streams from crude, coker, and hydrotreater units, and the saturated gas plant;
iv. C4, or Coker 2, receives vent streams from only #2 coker;
v. C5, or Alkylation, receives vent streams from only the alkylation unit.

C1 through C4 utilize flare gas recovery (FGR) systems to capture, compress, and return to the plant organic material that would normally be combusted in the flare. Flares C1 and C4 share two compressors, while flares C2 and C3 share a single compressor. The recovered organic material is sent to a fuel gas treatment unit to remove impurities before being sold offsite or returned to the plant as a feedstock or as combustion gas for heating units.

C2 & C3

This recovery system utilizes a flowmeter, which is located after the recovery system and just before the flare. There is normally no flow to the flare because all routine gases are captured by the FGR system. The flow to the flare is trended on the control room computer (DCS) system. Whenever there is a release to the flare, operations personnel report the incident to plant environmental personnel. Mr. Klickman said that most; if not all flaring events in recent years were caused by malfunctions.

Citgo is able to estimate the organic content of the vent stream flowing to the flare via weekly gas samples taken at the FGR system. If operations personnel are able to provide process data for a particular malfunction, that can be used as well. Mr. Klickman said the base load higher heating value is approximately 1300 BTU/scf.

C1 & C4

There is no flowmeter between the FGR system and the flare for the C1 & C4 system, and there is no weekly analysis of vent gas to the FGR system. Mr. Klickman said the C1 & C4 units have fewer flaring events, meaning most vapors are captured by the FGR system. Nonetheless, operations personnel will still notify the environmental personnel when there is a significant flaring event. These notices may contain information sufficient to estimate mass and heat content of the flared gas.

C5

There is no FGR system, but Mr. Klickman said the number of flaring events is small. There is a caustic scrubber before the flare to removed hydrogen fluoride. Citgo would have no records to demonstrate the vent stream's heat content.

Steam

Mr. Kielma and Mr. Martens joined us for the discussion of steam addition at the flare tips. Mr. Klickman explained that Citgo uses an infrared (IR) monitor and video camera to view the flare tips. The IR monitor can detect presence of the pilot flame. He believed operators control the steam manually during malfunction events.

Mr. Martens explained the various steam input locations on the flare tip. The C2 & C3 flares have the following minimum steam flows:

800 #/hr for the upper ring
600 #/hr for the lower steam
500 #/hr for seal steam

Steam flow measurement is made on the combined line to each flare, so only a total steam flow is measured. Citgo supposed it could determine historic steam flows on these lines.

PLANT TOUR:

The plant tour began at approximately 10:40. The group visited the C4 flare first and saw the compressors and the flare itself. There appeared to be a substantial amount of steam exiting the flare tip.

The next destinations were C1, C2, and C3. Flares C2 and C3 had a moderate amount of steam exiting the tip. We drove past the single compressor for C2 and C3. Finally, we drove past C5. No flaring events appeared to have been occurring during our tour.

I thanked the Citgo representatives for their time. The inspection concluded around 12:00.